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EXAMINER

LAI, VINCENT

ART UNIT PAPER NUMBER

2181

DATE MAILED: 09/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------------|-----------------------------|--|
| Office Action Summary | Application No. 10/822,553 | Applicant(s) JOHN ET AL. | |
| | Examiner Vincent Lai | Art Unit 2181 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.


FRITZ FLEMING
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5/26/2004.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. 9/5/2006
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Priority

1. This application discloses and claims only subject matter disclosed in prior Application No. 60/462,513, filed 11 April 2003, and names an inventor or inventors named in the prior application. Accordingly, this application may constitute a continuation or division. Should applicant desire to obtain the benefit of the filing date of the prior application, attention is directed to 35 U.S.C. 120 and 37 CFR 1.78.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 26 May 2004 was considered by the examiner.

Oath/Declaration

3. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

It was not executed in accordance with either 37 CFR 1.66 or 1.68.

The signature for Tao Li has not been dated.

Drawings

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "134" has been used to designate both the bits of the U-BHSR and the bits of U-BHT in figure 1B. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

5. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Branch Prediction Apparatus, Systems and Methods Utilizing Kernel and User Contexts."

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

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Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 1-9, 10-13, and 31-34 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Steps of accessing in claims 1, 10, and 31; steps of retrieving in claims 2; and steps of determining in claims 6-7, and 11 are all directed to non-statutory subject matter as there is no real-world effect associated with such actions. All other claims are rejected for their dependencies to claims mentioned above.

Claims 10-13 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Machine-accessible medium is not statutory subject matter.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-25, and 27-41 are rejected under 35 U.S.C. 102(b) as being anticipated by Li et al (Improving Branch Predictability in Java Processing), herein referred to as Li.

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As per claim 1, Li discloses a method, comprising:

accessing branch history information associated with a current operating context from a plurality of designated branch history storage locations (See paragraph 2 of page 4: Branch history is saved in tables), wherein each one of the plurality of designated branch history storage locations is associated with a corresponding plurality of operating contexts including the current operating context (See section 3 on page 5: Operating system activity is considered).

As per claim 2, Li discloses wherein accessing the branch history information further includes:

retrieving branch history information associated with the current operating context (See section 3 on page 5: Predictions are made during runtime).

As per claim 3, Li discloses wherein accessing the branch history information further includes: storing branch history information associated with the current operating context (See paragraph 1 of page 15).

As per claim 4, Li discloses further comprising:

storing branch history information associated with a first operating context included in the plurality of operating contexts in a first location included in the plurality of designated branch history storage locations (See figure 2 on page 9).

As per claim 5, Li discloses further comprising: storing branch history information associated with a second operating context included in the plurality of operating contexts in a second location included in the plurality of designated branch history storage locations (See figure 2 on page 9).

As per claim 6, Li discloses further comprising: determining a course of action based on a condition of branch history information associated with a selected context associated with a selected one of the plurality of designated branch history storage locations (See figure 2 on page 9)

As per claim 7, Li discloses further comprising:
determining the current operating context (See figure 2 on page 9: Done through the execution mode).

As per claim 8, Li discloses wherein the plurality of operating contexts includes at least one of an operating system context and a user context (See figure 2 on page 9).

As per claim 9, Li discloses wherein the operating system context includes a kernel context (See figure 2 on page 9).

As per claim 10, Li discloses an article comprising a machine-accessible medium having associated data, wherein the data, when accessed, results in a machine performing:

accessing branch history information associated with a current operating context from a plurality of designated branch history storage locations (See paragraph 2 of page 4: Branch history is saved in tables), wherein each one of the plurality of designated branch history storage locations is associated with a corresponding plurality of operating contexts including the current operating context (See section 3 on page 5: Operating system activity is considered).

As per claim 11, Li discloses wherein the machine-accessible medium further includes data, which when accessed by the machine, results in the machine performing:

determining the current operating context based on a type of instruction previously executed (See figure 2 on page 9: Done through the execution mode).

As per claim 12, Li discloses wherein the machine-accessible medium further includes data, which when accessed by the machine, results in the machine performing:

storing branch history information associated with a first operating context included in the plurality of operating contexts in a first location included in the plurality of designated branch history storage locations (See figure 2 on page 9); and

storing branch history information associated with a second operating context included in the plurality of operating contexts in a second location included in the

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plurality of designated branch history storage locations, wherein the first and second locations are included in a pair of registers (See figure 2 on page 9).

As per claim 13, Li discloses wherein each one of the plurality of designated branch history storage locations is included in a substantially contiguous series of memory locations forming an addressable memory block (See paragraph 1 on page 12: The memory array is a contiguous series of memory locations).

As per claim 14, Li discloses an apparatus, comprising:

at least a first storage location to store branch history information associated with a first operating context selected from a preselected plurality of operating contexts (See figure 2 on page 9); and

at least a second storage location to store branch history information associated with a second operating context selected from a preselected plurality of operating contexts (See figure 2 on page 9).

As per claim 15, Li discloses wherein the preselected plurality of operating contexts includes at least one of a user context and an operating system context (See figure 2 on page 9).

As per claim 16, Li discloses wherein the first storage location is included in a first designated portion of a memory (See figure 2 on page 9).

As per claim 17, Li discloses wherein the second storage location is included in a second designated portion of the memory that does not overlap the first designated portion of the memory (See figure 2 on page 9).

As per claim 18, Li discloses wherein the first storage location and the second storage location each comprise one or more registers (See figure 2 on page 9).

As per claim 19, Li discloses wherein the first storage location and the second storage location each comprise a plurality of bits within a single register (See table 2 on page 4 and figure 2 on page 9: The register must be comprised on a plurality of bits to hold the information necessary in table 2).

As per claim 20, Li discloses further comprising:
a branch history table having a dynamically switched input coupled to at least one bit included in the first storage location and at least one bit included in the second storage location (See figure 2 on page 9).

As per claim 21, Li discloses wherein the dynamically switched input can be switched according to an indication of a current operating context included in the preselected plurality of operating contexts provided by a processor status register (See figure 2 on page 9).

As per claim 22, Li discloses wherein the branch history table is capable of receiving an indication of a selected branch address modified by the indication of the current operating context (See figure 2 on page 9).

As per claim 23, Li discloses further comprising:

a split branch history table having a first portion to receive at least one bit included in the first storage location and a second portion to receive at least one bit included in the second storage location (See figure 2 on page 9).

As per claim 24, Li discloses further comprising:

a processor status register to provide an indication of a current operating context including the preselected plurality of operating contexts to a prediction resource coupled to the split branch history table (See figure 2 on page 9).

As per claim 25, Li discloses a system, comprising:

a processor to execute a plurality of instructions within a first operating context selected from a plurality of operating contexts and within a second operating context selected from the plurality of operating contexts (See figure 2 on page 9);

at least a first storage location to store branch history information associated with the first operating context (See figure 2 on page 9); and

at least a second storage location to store branch history information associated with the second operating context (See figure 2 on page 9).

As per claim 27, Li discloses further comprising: a memory coupled to the processor, the memory including the first storage location and the second storage location (See figure 2 on page 9).

As per claim 28, Li discloses wherein the memory includes at least one shift register (See paragraph 2 on page 4).

As per claim 29, Li discloses further comprising: a processor status register included in the processor to provide an indication of a current operating context included in the plurality of operating contexts (See figure 2 on page 9).

As per claim 30, Li discloses further comprising: a split branch history table including the first storage location and the second storage location (See figure 2 on page 9).

As per claim 31, Li discloses a method, comprising:
accessing a first branch history associated with a first operating context (See figure 2 on page 9); and

accessing a second branch history associated with a second operating context
(See figure 2 on page 9),

wherein the first branch history is separated from the second branch history (See figure 2 on page 9).

As per claim 32, Li discloses further comprising: separating the first branch history from the second branch history (See figure 2 on page 9).

As per claim 33, Li discloses wherein the first operating context includes an execution of a plurality of user instructions (See figure 2 on page 9), and wherein the second operating context includes an execution of a plurality of operating system instructions (See figure 2 on page 9).

As per claim 34, Li discloses further comprising:
predicting a branch within the first operating context based upon information stored in the first branch history (See figure 2 on page 9); and
predicting a branch within the second operating context based upon information stored in the second branch history (See figure 2 on page 9).

As per claim 35, Li discloses a branch prediction apparatus, comprising:
at least a first storage location to store branch history information associated with an execution of a plurality of user instructions (See figure 2 on page 9); and

at least a second storage location to store branch history information associated with an execution of a plurality of operating system instructions (See figure 2 on page 9),

wherein the first storage location and the second storage location are separated (See figure 2 on page 9).

As per claim 36, Li discloses further comprising:

a first storage location to store branch history information associated with a first operating context selected from a preselected plurality of operating contexts (See figure 2 on page 9); and

a second storage location to store branch history information associated with a second operating context selected from the preselected plurality of operating contexts (See figure 2 on page 9).

As per claim 37, Li discloses further comprising: a branch history table having a dynamically switched input coupled to the first storage location and the second storage location (See figure 2 on page 9).

As per claim 38, Li discloses a method, comprising:

predicting a branch within a first operating context using a first strategy (See figure 2 on page 9); and

predicting a branch within a second operating context using a second strategy
(See figure 2 on page 9).

As per claim 39, Li discloses further comprising: separating a first branch history associated with the first operating context from a second branch history associated with the second operating context (See figure 2 on page 9).

As per claim 40, Li discloses wherein the first operating context comprises a user context (See figure 2 on page 9), and wherein the second operating context comprises an operating system context (See figure 2 on page 9).

As per claim 41, Li discloses wherein the first strategy includes accessing a branch history associated with a user context (See figure 2 on page 9), and wherein the second strategy includes accessing a branch history associated with an operating system context (See figure 2 on page 9).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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8. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al (Improving Branch Predictability in Java Processing), herein referred to as Li.

As per claim 26, Li teaches the system of claim 25 (see above).

Li does not teach the system further comprising a wireless transceiver coupled to the processor.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to have modified Li to include a wireless transceiver coupled to the processor. In the introduction (Section 1 on page 1), Li teaches that the devices is to be used as a mobile device and it would have been obvious to a person having ordinary skill in the art at the time the invention was made to include a wireless transceiver if mobility was a key feature.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to show further art related to a branch prediction apparatus, systems and methods utilizing kernel and user contexts:

U.S. Patent # 5,577,217 to Hoyt et al shows a method and apparatus for a branch target buffer with shared branch pattern tables for associated branch predictions.

U.S. Patent # 5,935,241 to Shiell et al shows a multiple global pattern history tables for branch prediction in a microprocessor.

U.S. Patent # 6,108,775 to Shiell et al shows a dynamically loadable pattern history tables in a multi-task microprocessor.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vincent Lai whose telephone number is (571) 272-6749. The examiner can normally be reached on M-F 8:00-5:30 (First BiWeek Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Fritz M. Fleming can be reached on (571) 272-4145. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Vincent Lai

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